

### Deadtime/losses due to neutrons

The rates in the CPV and PV (including the PR and CAL and excluding the beam catcher) due to neutron halo interactions was estimated with a GEANT3 simulation of the KOPIO neutral beam to be 1 MHz and 1.5 MHz, respectively, at  $N_K = 4.32 \text{ K}_L^0$  exiting the spoiler per microbunch. The random losses in the beam catcher due to neutron interactions is estimated from GEANT3 studies at  $N_K = 4.32$  to be 2.8%.

At the optimum spill length, we have  $N_K = 2.14$ , the loss due to halo neutrons is 0.015 and the loss due to neutron beam interactions in the catcher is 0.014. By contrast, the loss due to stopped muons is 0.122 and the loss due to  $\text{K}_L^0$  decays in the same microbunch is 0.393.